

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the following remarks.

Claims 1-18 and 29 are pending and claims 19-28 remain withdrawn from consideration. No claims are amended, no claims are newly canceled, and no claims are newly added. Accordingly, this response introduces no impermissible new matter.

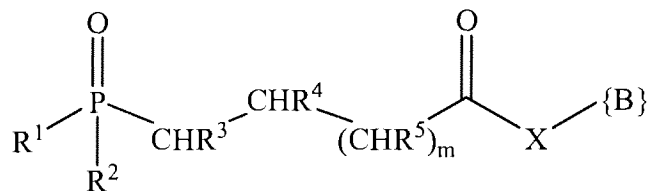
Examiner Interview Summary

Applicant's representative thanks Examiners Heincer and Eashoo for taking part in a telephonic interview on August 13, 2008. The standing rejections were discussed. The Examiners indicated the rejection based on Hatakeyama could be overcome by showing that the purpose of Hatakeyama would be subverted if the proposed modification were employed. The combination of Okada and Billington was discussed as well, with the Examiners elaborating on their position that a chemical moiety from Okada and a chemical moiety from Billington together underscore the obviousness of Applicant's invention.

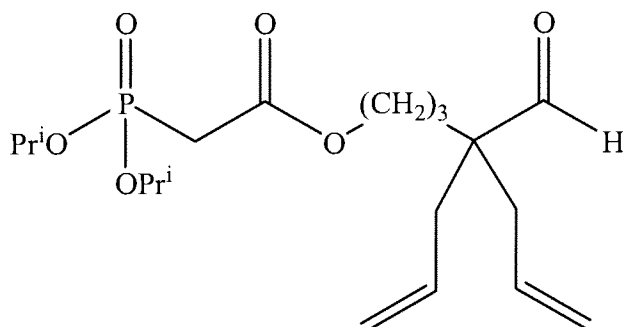
Hatakeyama Does Not Disclose Structurally Relevant Compounds

Claims 1-12 stand rejected under 35 U.S.C. § 103(a) over Hatakeyama *et al.*, *Tetrahedron Letters* 28: 2717-20 (1987). Applicant respectfully traverses this rejection because Hatakeyama neither suggests the claimed compounds nor evidences reasons for the skilled artisan to have modified its teachings, thereby to provide the claimed compounds.

Pursuant to claim 1, when **n** is 1 the resultant structure may be represented as:



As the Examiner pointed out, Hatakeyama discloses compounds of the following formula:



Thus, the Examiner has admitted that Hatakeyama teaches no compound as claimed, but he does assert disclosure of a homolog with one fewer methylene group. Office Action, page 2. This is “close enough,” in the Examiner’s estimation (*id.*, page 3), but Applicant must disagree.

The structural distinction at issue does not resolve to a mere *omission* of a methylene group; rather, Hatakeyama effectively *requires* that methylene, i.e., P(O)CH₂C(O), as described below. Accordingly, Hatakeyama actually would have led the skilled artisan away from inserting a second methylene group or more into a Hatakeyama compound.

In particular, the Hatakeyama compounds are phosphonoacetates used for mediating ester exchange reactions. See summary, page 2717. According to the nomenclature used, the *acetate* portion of phosphonoacetate is directed to the single methylene group between the phosphorus atom and the carbonyl group. To add any other methylene groups into that space would result in compounds that are no longer phosphonoacetates. As Hatakeyama indicated, in describing the Hoffmann-La Roche process for preparing macrodiolides:

The synthetic route based upon the Wadsworth-Emmons olefination seems to be an attractive one, however, the *requisite* aldehydophosphonoacetates are often difficult to prepare. We have recently developed a new synthetic method for phosphonoacetates from alcohols by 4-DMAP-catalyzed ester exchange reaction of easily available phosphonoacetates as reported in the preceding paper.

(References omitted; emphasis added.)

The method described by Hatakeyama uses diisopropylmethoxycarbonylmethylphosphonate as a starting material for the preparation of the phosphonoacetates. By contrast, there is nothing to suggest using anything other than the acetate precursors. In fact, Hatakeyama's cross-references to earlier publications highlight the fact that the phosphonoacetate structure is required for the reaction. One of these publications, by Stork, G. and Nakamura, E. *J. Org. Chem.* 44: 4010-11 (1979) (appended), is one of the first reports of using phosphonoacetates for macrolide cyclization reactions. In the second paragraph, the author states that "[w]e have examined the possibility of forming macrocyclic lactones by closing the ring at the carbon α to the ester linkage by an internal version of the phosphonoacetic ester method."

Applicant would point out that the named method is as a phosphonoacetic ester method, whereby the ring closes at the carbon atom α to the ester. Thus, Hatakeyama and the publications cited there manifest two points clearly: (1) the name of the reaction implies nothing other than a single methylene group; and (2) the group **must** be a **single** methylene, in order for the carbon atom α to the ester to be involved in the ring closure.

In Hatakeyama, the cyclization is shown as the last step of converting compound 19 to compound 20. As these are Wittig-type reactions, the phosphorous group that is attached to the carbon α to the ester leaves during the reaction, effecting the ring closure. Any other arrangement would cause a carbon other than the carbon that is α to the ester to be in the ring closure. By the same token, any extension of the carbon chain between the phosphorous atom and the carbonyl group in a Hatakeyama compounds would foreclose the proper cyclization reaction, thereby subverting Hatakeyama's purpose.

There is not question that, when a proposed modification would render the teachings of a reference unsuitable for the latter's intended purpose, then perforce there was no motivation to have effected that modification. MPEP 2143.01(V). More generally, Hatakeyama evidences not rationale for one of ordinary skill to have modified any prior-art compound, as posited by the

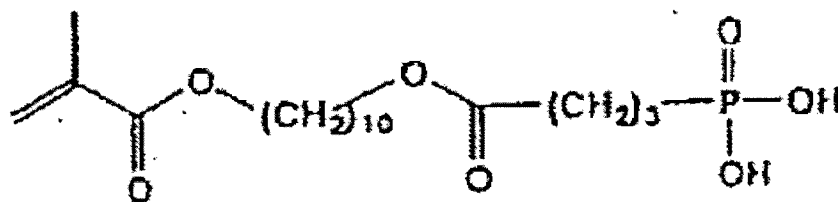
Examiner; indeed, Hatakeyama and the publications cited there actually teach away from the Examiner's proposed modification. Accordingly, Applicant respectfully requests withdrawal of the rejection based on Hatakeyama.

Okada and Billington Do Not Obviate the Claimed Invention

Claims 1-18 and 29 stand rejected over the combination of WO 00/58316 (equivalent to U.S. 6,458,868) to Okada *et al.* with U.S. 4,514,342 issued to Billington *et al.* Applicants respectfully traverse this rejection.

As structurally represented by formula I in claim 1, the claimed compounds are phosphonates, *i.e.*, a $RR'P(O)R''$ moiety. The full structure of Formula I is $[(R^1)(R^2)P(O)-(CHR^3)-(CHR^4)-(CHR^5)_m-C(O)X-]_n\{B\}$, and B is a substituent having *more than one* organically polymerizable group that contains a C=C moiety, has at least 2 carbon atoms, and includes no silicon atoms.

In rejecting the claims over Okada plus Billington, the Examiner points to the compound of formula



in Table 9 of Okada (Office Action, page 3). This compound of Okada is named "5b" in the reference, where compound "5a" is similarly structured but with a $(CH_2)_5$ group in place of 5b's $(CH_2)_{10}$ group.

According to the preparative procedures provided by Okada in Examples 8-1 and 8-2, however, the actual compounds have a $-(CH_2)_2-$ moiety in place of the structurally represented –

(CH₂)₃ - moiety. This is evident when the nomenclature (*i.e.*, a “propionate”) and the synthetic procedure, starting from 2-carboxyethylphosphonic acid, are taken into account.

Informed by discussions had during the August 13th interview, Applicant understands the Examiner to allege that the claimed compounds are obvious in light of a presaged use of the precursors for compounds 5a and 5b of Okada with the polyesterified polyol of Billington. The Examiner further contends that Billington’s complete group of formula II, apart from the OH group, comports with the {B} group of the presently claimed compounds.

Yet, this justification for the rejection entails an impermissible picking and choosing of chemical moieties, based on 20-20 hindsight. Certainly, the combination finds no basis in either Okada or Billington. Applicants address each reference separately, and then in combination below.

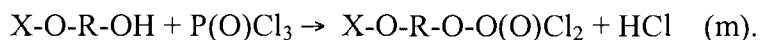
Turning first to the references separately, Applicant submits that Okada does not comport with the Examiner’s stated position. Okada teaches as one objective of invention that he “intensively studied in view of (1) the improvement in the color tone and (2) the improvement in the storage stability of the phosphate monomer.” Column 8, lines 3-5. As a result of such study, Okada found the color of the final products to be affected by carbonyl group impurities in a reactant diol. Column 9, lines 10-35. Thus, a significant portion of Okada is directed to phosphate complexes prepared with diols and minimizing the carbonyl content of the diol. The storage stability was found to be affected by the incorporation of trace amounts of ionic materials. Column 10, lines 33-42. To address these issues, Okada describes “a process for preparing a phosphate monomer of the present invention, it is desired to employ a preparation process in which the amount of a substance causative of coloring or the amount of ionic substances admixed in the resulting product is made as small as possible.” Column 11, lines 49-54.

With such objectives set forth, Okada is directed to (1) an organic phosphate compound having at least one radically polymerizable double bond, (2) a dental composition thereof, (3,

4) processes for preparing (meth)acrylic acid monoester monophosphate esters from *phosphorous oxychloride*, (5) a process for preparing an organic phosphate compound from a *phosphorous oxyhalide*, and (6) a process for preparing a (meth)acrylic acid monoester monophosphate ester from a *phosphorous oxychloride*. Column 4, line 16 to Column 5, line 37. The ideals of low color and good storage stability, in view of Okada's directives 1-6, make it clear that his invention is based upon phosphates prepared from phosphorous oxyhalide species such as the oxychloride. The examples bear this out, with Okada describing the preparation of a number of phosphate compounds, such as those listed in Table 9 as compounds 1a - 4. Every example is of a compound with a single (meth)acrylate residue.

In describing the synthetic procedures to accomplish the above objectives, Okada generally describes the preparation of the phosphates as:

The reaction process is represented by the following chemical equation (m).



Wherein X-O-R-OH is a (meth)acrylic acid monoester; X is a (meth)acryl group; and R is an organic residue having 4 to 30 carbon atoms.

Column 18, lines 34-40.

There is no such general procedure in Okada for the preparation of phosphonates, however, Okada does specifically exemplify the preparation of two phosphonate compounds, based on a specific reaction scheme from 2-carboxyethyl phosphonate. The two compounds are 5a and 5b, as shown above. The skilled artisan is left with a single, specific preparative scheme for two compounds that differ only in the length of an alkyl chain, *i.e.* pentyl and dodecyl. Both of compounds 5a and 5b contain a single (meth)acrylate residue. Conversely, the skilled artisan does not receive from Okada a general preparative scheme, by which any alcohol-containing group may be reacted with 2-carboxyethyl phosphonate.

Before the present application, as Okada evidences, phosphonate compounds were difficult to obtain. As shown above, Okada discloses a single method for preparing a phosphonate, via steps that are tedious and hazardous. In the first step, triethylphosphite is contacted with β -propiolactone, a well-known carcinogen. In the second step, the product of the first triethylphosphite and β -propiolactone step is reacted with HBr (highly toxic) and formic acid (also toxic) to form 2-carboxyethyl phosphonate. Thus, Okada's narrow description and the concomitant toxicity of the resultant materials would have dissuaded the skilled artisan from a broader application, suitable to the reaction of any alcohol-containing group with 2-carboxyethyl phosphonate, for use in preparing a dental composition.

Billington is directed to phosphate compounds $[(RO)_2P(O)OR']$ as compared to the presently claimed phosphonates $[(RO)_2P(O)R']$. In other words, Billington describes the preparation and utilization of a class of compounds that is distinct from the presently claimed compounds. Billington prepares his compounds through phosphorylation of the compounds of Formula II, by reaction with phosphorous oxychloride or phosphorous pentoxide. This is the methodology adopted by Okada as well, for the preparation of those phosphates. There is no suggestion in Billington for preparing phosphonates.

Based upon the teachings of Okada and Billington, therefore, the skilled artisan would have received guidance with respect to (i) a range of preparative schemes for phosphates and (ii) a single preparative scheme, without any direction to broad applicability, for phosphonate compounds. In fact, the directives set forth in Okada, with the goals of low color and low ionic content, would have guided the skilled in the art to the preparation of Okada's phosphates.

The two phosphonates of Okada (5a, 5b) both have a single (meth)acrylate residue (*i.e.*, a single polymerizable double bond). Even more significantly, Okada evidences no motivation for the skill artisan to have used more than a single such residue in a phosphonate compound. Accordingly, one of ordinary skill would not have entertained any expectation of success in making the Examiner's proposed modification of compounds 5a and 5b of Okada.

Applicants submit that the lack of a broader teaching in Okada with respect to phosphonate compounds, and the focus of Okada on the preparation of phosphates, is fatal to a determination of obviousness based upon the combination of Okada and Billington. To assert anything of broader applicability to the singularly described synthetic procedures of phosphonates in Okada is tantamount to an impermissible hindsight reconstruction, informed by the present application. Thus, Applicant submits that a case of obviousness has not been established, and respectfully requests that the Examiner withdraw the rejections and allow the application to move forward to issuance.

IV. Request for Rejoinder of Claims

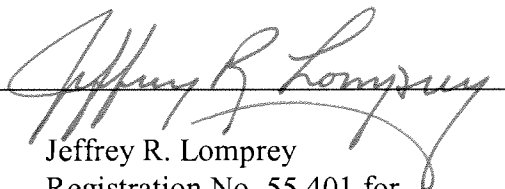
In making the requirement for restriction final, the Examiner stated that the compound of claim 1 was shown in the cited art of Balsamo. Since claim 1 is now free of the art, Applicant submits that formula (I) embodies a special technical feature that ties together each of the proposed groups of claims. Thus, the Examiner's grounds for imposition of the finality of the restriction are overcome. Accordingly, Applicant requests that Groups II and III be rejoined to the present application, and allowed to move forward to issuance with the present application.

Applicant submits that this application is in condition for allowance. Favorable reconsideration is requested, therefore. Examiner Heincer is invited to contact the undersigned directly, should he feel that any issue warrants further consideration.

Respectfully submitted,

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